Evolution of the Gate Model

February 2000

Laying the groundwork

In fiscal year 1996 the Office of Science and Technology (OST) implemented the Technology Decision Process, or "gate model," to track the maturity of its technology development projects. The model is a user-oriented decision-making process linking development activities with cleanup operations. It provides a basis for assessing and managing the expectations, performance, and transition of technologies through the development process.

The model identifies seven stages of maturity, each characterized by specific criteria, requirements, and deliverables:

- basic research
- applied research
- exploratory development
- advanced development
- engineering development
- demonstration, and
- implementation.

These stages are separated by six "gates"—decision points at which projects are evaluated before being funded for the next stage. Through a peer review program, projects are assessed at each gate against both technical and nontechnical criteria to ensure that the technologies developed can provide superior performance, meet user requirements, and be moved into the marketplace.

In 1997, OST transferred the responsibility for gate reviews to the Focus Areas and issued guidance for applying six criteria to be used for assigning a project to a stage. Gate criteria provided the basis for Focus Area program reviews in 1998, and in 1999 OST issued guidance for incorporating gate review criteria into Focus Area midyear reviews and documenting the results.

The gate model is a useful tool for focusing attention on deployment, gauging progress, and informing decisions on project funding. Focus Areas will continue to manage projects using the original gate model with one modification: the criterion dealing with user needs will be split into two criteria: technical need and user involvement. This change reflects the increased emphasis on user participation described in the DOE Office of Environmental Management (EM) Strategic Plan for Science and Technology and the EM Research and Development Program Plan.

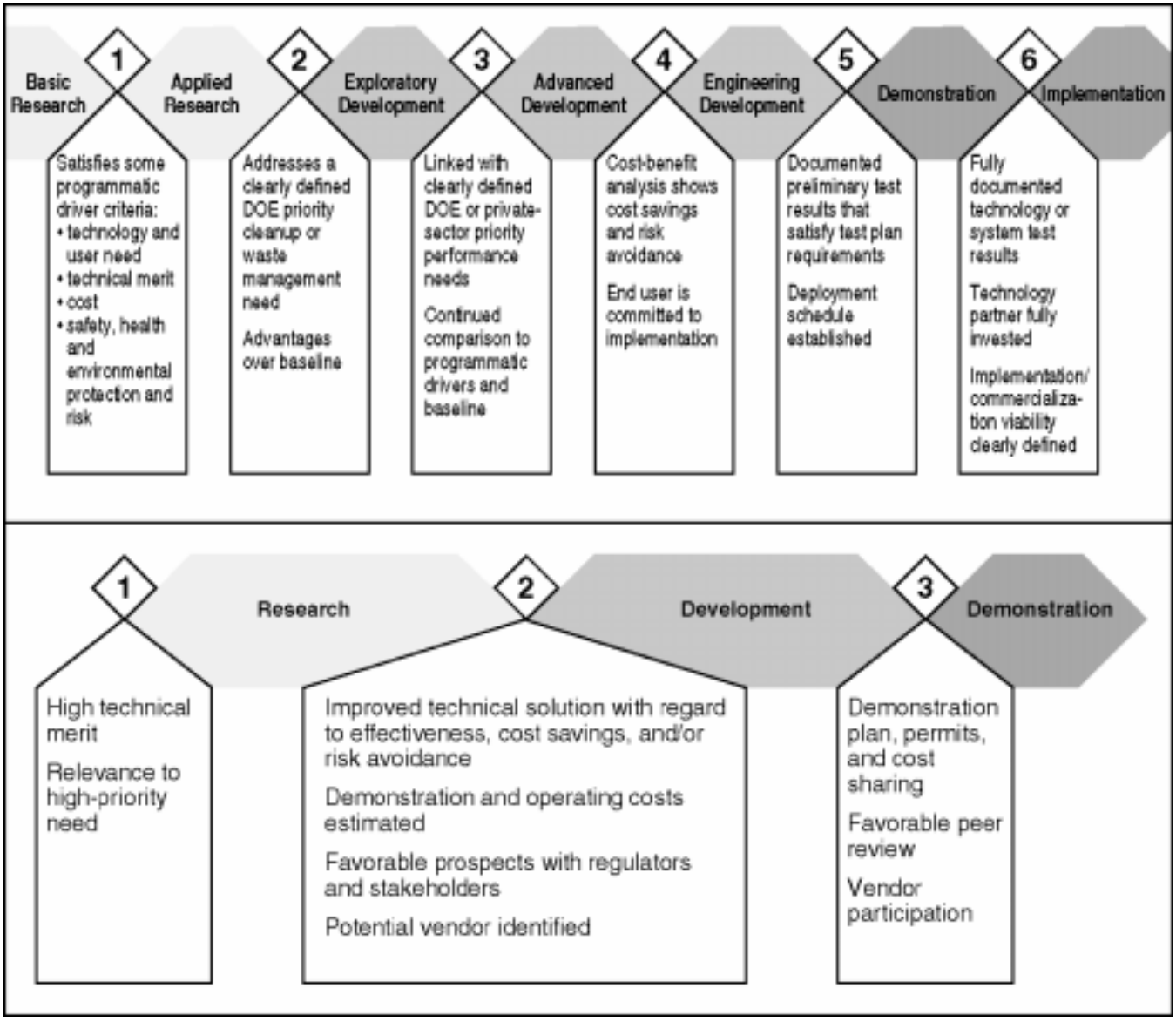
Improving the process

For broad program management, OST is transitioning to a model with fewer stages and streamlining gate documentation requirements.

Despite its strengths and usefulness, the original gate model had shortcomings. Some technologies enter the flow at an advanced stage of maturity. Development does not always follow a linear path; sometimes there is reversion to an earlier stage. Guidance for such a complex process can easily grow cumbersome, and information relevant to gate criteria is in constant flux.

The Government Accounting Office found that the Focus Areas did not apply the gate process consistently or use disinterested reviewers to determine the technical merit of proposed work. The National Research Council also called for strengthened external review and, more recently, recommended that OST streamline the process by reducing the number of gates requiring review and documentation.

OST concurred with these criticisms and is moving decisively in FY 2000 to respond to them. With the modification mentioned above, original gate model has been reaffirmed for project management by the Focus Areas, and the criteria will be applied consistently at midyear reviews. While the relative importance of criteria vary among problem areas and some technologies may never be truly commercialized, the gate model invariably requires planning to ensure that an appropriate vendor will be able to deliver the right technology or service to EM users.



Gate criteria for the original model (above), still used by Focus Areas for project management, and for the model refined for program management (below).

Meanwhile, OST is moving toward a simplified gate model requiring documentation at only three stages: research, development, and demonstration:

- **Research**, either "basic" or "applied," is the acquisition of new knowledge or data and enables the identification of potential solutions to problems.
- **Development** brings the solution to bear on a specific problem and generates the technical, cost, and engineering data required for a demonstration.
- **Demonstration** shows the performance of a solution, its complete implementation cost, and any scale-up issues that may exist.